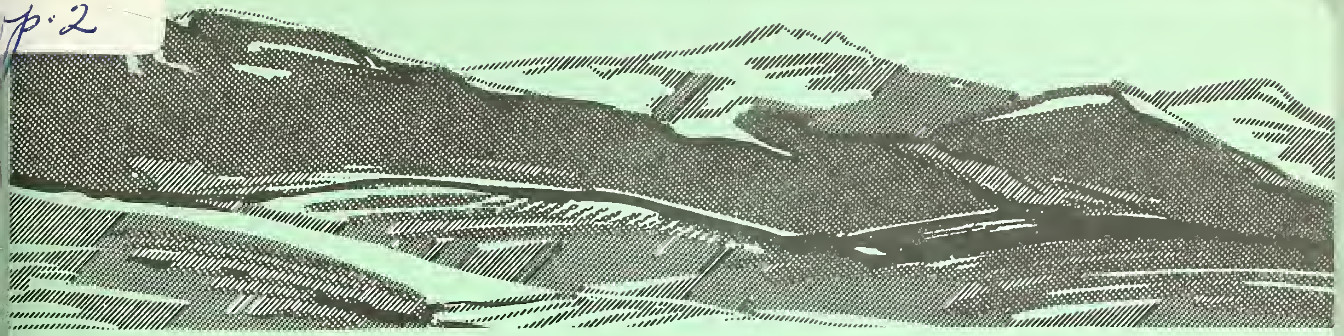

RANGE IMPROVEMENT NOTES

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FOREST SERVICE — U. S. DEPARTMENT OF AGRICULTURE
INTERMOUNTAIN REGION — OGDEN, UTAH

STATEMENT OF PURPOSE

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This publication is printed primarily to inform professional range administrators of important range improvement and management developments and findings. These "Notes" may include extracts of published papers, unpublished preliminary reports of research work, unpublished reports on administrative studies and personal observations or suggestions of other range administrators. No claim is made as to the accuracy or completeness of studies or conclusions drawn.

All who read these RANGE IMPROVEMENT NOTES are encouraged to submit material for publication, or suggestions for improving its usefulness. Full credit will be given for any material used.

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RABBIT BRUSH COMPETITION AND CONTROL ON UTAH RANGELANDS

By

C. Wayne Cook, Paul D. Leonard, and Charles D. Bonham[1]

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SUMMARY AND CONCLUSIONS

A study was conducted during 1959 through 1964 in central and northern Utah to determine the effects of date and rate of application of 2,4-D on big and little rabbitbrush. Esteron 76-E (2,4-D isopropyl and butyl ester) was used in a water carrier and applied on 2 dates and at 3 rates (2.0, 3.0, and 4.0 pounds of acid-equivalent per acre). A cross application was made in 1961 by applying a 2- and 3-pound rate over the 1960 treatments.

Age of the big rabbitbrush plants ranged from 3 to 8 years and little rabbitbrush plants ranged from 3 to 17 years.

The effectiveness of 2,4-D on rabbitbrush varied with species, date and rate of application, and the year in which the herbicide was applied. Kills of big rabbitbrush ranged from 47.01 to 92.84 percent with a foliage reduction of 96.44 to 98.91 percent. The 2,4-D was less effective in killing little rabbitbrush. Kills of little rabbitbrush varied from 15.61 to 82.98 percent with a foliage reduction of 22.37 to 87.22 percent.

Basal resprouting occurred on plants that were not killed by the 2,4-D. Plants only partially killed recovered and produced plants of normal size within a few years.

There was little difference between the 3- and 4-pound rate of application on big rabbitbrush but there was a significant difference between the 2- and 3-pound rates. Herbicide treatment of little rabbitbrush showed a significant difference among all 3 rates in most cases. Evidently, the 3-pound rate is high enough in most cases to obtain satisfactory results on both species if soil and weather conditions are optimum.

In all cases where poor results were obtained after one treatment, an additional application of 3 pounds of 2,4-D the following year increased the kill of both big and little rabbitbrush.

Summary - Bulletin 454, Agricultural Experiment Station, Utah State University, Logan, Utah, September 1965.

[1] Dr. Cook is Research Professor, Dept. of Range Management, USU; Mr. Leonard is Range Conservationist with Bureau of Land Management; and Mr. Bonham is a graduate student at Colorado State University.

Atmospheric temperature may have been important in altering the amount of kill obtained from the herbicide treatment on little rabbitbrush. High soil moisture coupled with high atmospheric temperature gave significantly better kills than low soil moisture and low atmospheric temperature. The most effective year for the application of herbicide was 1962. In mid-June of that year the soil moisture available for plant growth was more than 4 percent. Soil and atmospheric temperatures were relatively high. This contrasted with the condition in 1961 when poor kills resulted and the available soil moisture was below 2 percent. Nevertheless, atmospheric temperatures were considered favorable during both dates of spray application.

Only 1 of the 3 years included in the study was considered favorable for control of little rabbitbrush, but 2 of the 3 years were considered favorable for the control of big rabbitbrush.

During the spring of 1963, effectiveness of Tordon 22-K on control of little rabbitbrush was compared with Kuron and Esteron 76-E. Tordon 22-K was outstanding at all locations tested. There was no statistical difference between Kuron and Esteron 76-E, but Tordon 22-K gave significantly better kills of little rabbitbrush than either Kuron or Esteron 76-E.

In 1964, Tordon 22-K and Tordon 101 were compared with Kuron plus Tordon 22-K. All 3 herbicide treatments gave excellent control of little rabbitbrush but 1.33 pounds of Kuron plus one-third pound of Tordon 22-K gave somewhat higher kills than the other 2 herbicides at most locations. No statistical differences were found among the 3 herbicides.

All forms of Tordon were effective in controlling both big and little rabbitbrush species.*

In areas where big and little rabbitbrush were controlled, yields of grass increased an average of 336 pounds and 129 pounds per acre respectively. Soil moisture during most of the summer was higher on plots where the brush was removed from competition with the grass.

From 1962 to 1964 a study to determine the competitive effect of big rabbitbrush on production and vigor of crested wheatgrass and tall wheatgrass was conducted at the Benmore experimental area in central Utah. Moisture depletion in the root zone of crested wheatgrass was more rapid than that of big rabbitbrush. Available soil moisture to a depth of 18 inches under both grass and rabbitbrush plants, however, was depleted before late summer or autumn. Plots without plants had available soil moisture the entire summer. It was concluded that big rabbitbrush uses soil moisture that would otherwise be available for grasses.

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*Underlining added by editor.

Soil temperature measurements were made throughout the study and no significant differences were observed under grass, as compared to rabbitbrush.

Grass responses were measured by collecting production and vigor data for 3 consecutive years. Yields of herbage from grass plants growing within 10 inches of rabbitbrush plants were significantly less than yields from grass growing within 36 inches of rabbitbrush. Likewise, the basal area of the grass crown and the number of seed heads per plant were reduced by the competitive effect of big rabbitbrush.

Presence of wheatgrass plants in association with big and little rabbitbrush decreased the extent of rabbitbrush roots significantly; and likewise, the presence of rabbitbrush plants affected the root growth of the grasses.

Since big rabbitbrush continued to increase in well established stands of both crested and tall wheatgrass, it was concluded that this species is able to invade and survive in stands of wheatgrass located in foothill areas. This occurs even when no grazing is permitted.

This study indicates that grass and rabbitbrush compete for soil moisture during the spring and summer growing season.

Tordon 22-K weed killer is priced at $31 per gallon, containing 2 pounds Tordon. Supplied by Dow Chemical Company.

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One of the tests of leadership is
the ability to recognize a problem
before it becomes an emergency.
--Arnold H. Glasow

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SAFETY is no mystery . . . just COMMON SENSE.

SKELETON WEED - *Chondrilla juncea*

By Robert E. Higgins*

STOP this weed before it gets started!!

Skeleton weed is moving into Idaho. First identified in Kootenai County, in 1961. Found near Banks in Boise County, in 1963.

Reported in Spokane County, Washington in 1938. It has spread throughout the county and is a serious problem in grain fields and forage producing areas. In Idaho it is only appearing in waste and range lands.

Classed as biennial in some areas and as perennial in others, it has a deep tap root and is more aggressive than any of the other common tap-rooted weeds.

The plant grows and develops similar to chickory. A rosette appears early in the season, then a flower bearing stalk develops. The rosette is very similar to dandelion but may show more red and yellow coloring.

Rosette growth

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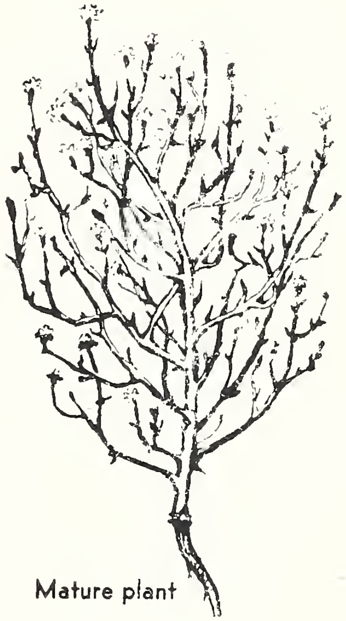
*Extension Agronomist, College of Agriculture, University of Idaho.

The flowering stem is 2 to 5 feet tall, is yellowish green with leaves reduced to mere bracts. Leaves and stem have a milky sap.

The flower is yellow. Chickory is blue.

The seeds are plumed and resemble wild salsify. The mature seed head is round and fluffy, similar to dandelion.

Flowering stem with bud, flower and seeds



Mature plant

Control: Tests in Washington show MCPA more effective than 2,4-D. Spray when weed is in rosette stage. Use plenty of water and cover thoroughly. Use a temporary soil sterilant on small infestations.

Watch For This Weed. Send specimens of suspected plants for positive identification. Generate interest for controlling and eliminating known infestations in your area.

Excerpts from an article entitled

AN EVALUATION OF CONTROL ON THE WASATCH POCKET GOPHER[1]

which appeared in the
JOURNAL OF WILDLIFE MANAGEMENT, Vol.29, No. 3, July 1965

V. B. Richens
Utah Cooperative Wildlife Research Unit, Logan[2]

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The Wasatch Mountains of northern Utah are grazed in the summer by large numbers of domestic livestock, mule deer and elk. A large proportion of this summer range is heavily infested with pocket gophers. Gophers are herbivorous and thus are assumed to be competitive with domestic livestock and game animals for forage. During the winter months only the gophers remain, and during this time they continue to forage.

The Monte Cristo area, 30 miles southeast of Logan, Utah, has consistently supported a heavy infestation of pocket gophers for many years. This high population has existed concurrently with frequent failures in the seeding of these high-mountain parklands to grass and with poor range conditions

In 1957, a cooperative gopher-control program was initiated on the Monte Cristo area by the U. S. Forest Service, the Bureau of Sport Fisheries and Wildlife, and Nick Chournos, livestockman. During that year, infested range was treated with poisoned grain (whole oats treated with 0.125 percent sodium flouroacetate - Compound 1080) for pocket gopher control. Each following year, 1958 through 1960, an additional area of range was treated for the first time and all areas poisoned previously were retreated. This provided areas with five different treatments, ranging from areas of no poisoning to areas treated from 1 to 4 consecutive years. The control consisted of hand baiting the gopher tunnels with the poisoned oats.

The objectives of this study were (1) to evaluate the effect of controlling pocket gophers from 1 to 4 successive years, (2) to determine the effects

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[1] Contribution from the Utah Cooperative Wildlife Research Unit in cooperation with the Intermountain Forest and Range Experiment Station, U. S. Forest Service, and the Branches of Wildlife Research and Predator and Rodent Control, Bureau of Sport Fisheries and Wildlife. The study project was financed by the Branches of Wildlife Research and Predator and Rodent Control, U.S. Bureau of Sport Fisheries and Wildlife; the Intermountain Forest and Range Experiment Station, U. S. Forest Service, and the National Wildlife Federation.

[2] Present address: Bureau of Sport Fisheries and Wildlife, Field Station Administration, University of California - Davis.

of different periods of control on vegetation density, composition, and yield, and (3) to evaluate the costs and determine the factors influencing the effectiveness of the control used.

A gopher population-per-acre index was determined for each of five treatments (0,1, 2,3, and 4 years' control) by saturation trapping on trap blocks for a 3-day period. The gopher population was reduced about half by the first year's control. Additional years of control, however, failed to significantly reduce the gopher population further. Only tunnels under new mounds were treated in the control program. These studies show that treatment of tunnels under old mounds, as well as new, could have increased the effectiveness of control as much as 20-30 percent.

Gopher Control Evaluation

The total cost of control on the 5,070 acres was $10,328.74, of which about 86 percent was for labor, 6 percent for transportation, and 8 percent for poisoned grain. The average cost per acre was $1.13 for initial treatment and $0.51 for retreatment, while the total cost per acre was $2.95 for the area treated 4 years. Though the cost for labor seems high, the average cost per man-hour was only about $1.36.

The cost per acre of retreatment decreased successively for 3 years (1958-60) in this study. On nearby range on which a similar control program was conducted, retreatment costs also decreased successively for 3 years, but in the fourth year of retreatment the costs per acre increased. Thus, the inference that successive reduction in costs can be expected from successive annual retreatment must be taken with caution.

Vegetation Studies

Perennials - The yield of air-dry forage in pounds per acre, though not so variable as plant numbers, exhibited considerable variation within treatments. Forage yields were consecutively greater from the 0 treatment to treatment IV in 1962. Treatment IV had more than twice the yield of the 0 treatment in 1962, and in 1961 it was more than three times.

Annuals - The abundance is highest for the 0 treatment and becomes successively smaller with additional years of treatment, but some of the differences are small.

Bulbed Plants - The differences between treatments were of similar magnitude to those of annuals, but the abundance for bulbed plants increased with years of treatment whereas the abundance of annuals decreased.

Yield of perennial plants, pounds per acre, air dry, from 1-acre sample areas, 1961-62.

Treatment	1961* Av. yield lbs/acre	1961* Range in yield	1962** Av. yield lbs/acre	1962** Range in yield
0	271.8	193-434	449.2	190-770
I	376.1	177-641	456.5	170-930
II	638.3	347-812	557.0	277-844
III	487.8	240-658	610.4	298-1296
IV	909.5	587-1499	1,006.6	611-1859

*Six sample areas

**Nine sample areas

Summary

The costs and effectiveness of a gopher control project vary with the gopher population, the kind and amount of vegetation, the condition of the soil, the terrain, the time of year, the temperature, the humidity, the type and quantity of bait, the control personnel, and the method. Nevertheless, effectiveness of control could be increased and costs reduced at Monte Cristo. To achieve better results at less expense, emphasis should be placed on treatment of tunnels under all ages of mounds, treatment during favorable weather and soil conditions, the time and degree of interference by livestock, the periods of greatest gopher activity, and the use of larger control crews for shorter periods of time.

Gopher control should be regarded as a long-term range improvement practice. Besides the additional forage made available to livestock and game animals, gopher control must be considered for its values in watershed protection and soil stabilization, as reported by other writers. Range benefit from control apparently results only if the gopher population is held down by an annual control program. Previous results show that it takes several successive years of control for the vegetation to recover. Hence, those who contemplate gopher control as a range improvement technique must plan on successive years of control, because cessation of control results in a rapid recovery of the gopher population.

On some ranges (such as at Monte Cristo), sheep use demands the retention or increase of perennial forb cover. On such ranges the use of 2,4-D for indirect control of gophers is not permissible. A poisoning program is required to reduce the gopher population when the objective is to stabilize the soil and improve the range for sheep. On cattle ranges, grass cover is usually desirable and does not produce conditions conducive to high gopher numbers. An intensive annual control program is perhaps necessary only until a good grass stand has been attained as long as proper grazing is practiced.

Excerpts From
Studies of Six Grasses Seeded on Sagebrush-Bunchgrass Range

By D. N. Hider and F. A. Sneva
Tech. Bull. No. 71, 20 pp., 1965
Oregon State University

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Six grasses were seeded in a sagebrush-wheatgrass habitat type in southeastern Oregon. Site was disked twice to clear sagebrush and fallowed one summer prior to seeding. The study lasted six years.

> Crested wheatgrass exhibited maximum productivity in the second growing season, a stable productivity in the fifth and sixth seasons, low palatability in July and August, early and fast accumulation of TWSC*, and morphological characteristics favorable to spring grazing. Siberian wheatgrass was very similar to crested wheatgrass in the characteristics observed.
>
> Beardless wheatgrass exhibited maximum productivity in the fourth growing season, a stable productivity in the fifth and sixth seasons, moderate palatability in July and August, late and slow accumulation of TWSC, and morphological characteristics favorable to late spring, summer, and fall grazing.
>
> Big bluegrass exhibited maximum productivity in the fourth growing season, a stable productivity in the fifth and sixth seasons, a strong yield decrease with increasing row spacing, high palatability in July and August, intermediately early accumulation of TWSC, weak rooting and susceptibility to pull up in the first three years, and morphological characteristics favorable to early spring and late summer or fall grazing.
>
> Pubescent and tall wheatgrasses exhibited declining productivities throughout the six years, and appeared to be poorly adapted to sagebrush-bunchgrass range.
>
> *Total water soluble carbohydrates.

(EDITOR'S NOTE: Copies of this publication are available from Oregon State University, Corvallis, Oregon.)

EFFECT OF FUNGI ON ESTABLISHMENT OF CRESTED WHEATGRASS

By
Al Bleak, Research Range Scientist
Agriculture Research Service
Utah State University

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The fungus, Podospriella verticillata, can reduce seed germination seedling emergence and plant establishment on revegetation projects in the western states. This fungus is widely distributed but is especially abundant in the sagebrush-grass vegetation zone. Work to date has demonstrated a high infection potential on all lands invaded by cheatgrass brome.

Podosporiella can be controlled by seed treatment prior to planting. Captan 75 at a rate of 12 ounces per 100 lbs. of seed, or Arasan 75 at a rate of 8 ounces per 100 lbs. of seed are recommended on fall plantings when the seed can remain in the soil for extended periods prior to full germination. Treatment rates of 8 ounces and 6 ounces per 100 lbs. of seed for Captan 75 and Arasan 75 are recommended for spring plantings.

Some commercial seed houses will probably furnish the necessary treatment for 2 cents per pound or less.

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SAFETY

is necessary to prevent

ACCIDENTS

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Our destinies are decided not by chance
but by choice--Our choice.